

[DOCUMENT NAME] CLAIMS

[CLAIM 1]

A valve device comprising:

- a valve housing body having a passage for fluid;
- 5 a valve guide arranged in the valve housing body;
- a valve stem sliding in the valve guide to open and close a valve; and
- a scraper provided on a passage side of the valve guide, the scraper having a truncated cone-cutting edge.

[CLAIM 2]

- 10 The valve device according to claim 1,
- wherein an inner diameter of the scraper is 0.2 – 1.0 mm larger than an outer diameter of the valve stem.

[CLAIM 3]

- The valve device according to claim 1 or 2,
- 15 wherein a distance between an end of the scraper and a passage side end of the valve guide is longer than a stroke of the valve.

[CLAIM 4]

- The valve device according to claim 1 or 2, wherein
- an outer diameter of the valve stem is smaller in a section corresponding to the
- 20 scraper than in a section corresponding to the valve guide; and
- an inner diameter of the scraper is equal to an outer diameter of the valve stem in a section corresponding to the valve guide.

[CLAIM 5]

- The valve device according to any one of claims 1 to 4,
- 25 wherein a seal member that applies gripping force onto an outer circumference of the valve stem is provided at a passage side end of the valve guide.

[CLAIM 6]

- The valve device according to any one of claims 1 to 5,
- wherein the fluid is exhaust gas recirculated to an internal combustion engine for

performing EGR, and the valve device is an EGR valve.

[CLAIM 7]

An EGR valve device comprising:

a valve housing body;

5 a hydraulic actuator provided on the valve housing body to open and close a valve;

an electromagnetic proportional actuator provided on the valve housing body; and

a hydraulic control valve advanced and retracted by the electromagnetic proportional actuator, the hydraulic control valve controlling hydraulic pressure acting on  
10 the hydraulic actuator by balancing a force of the electromagnetic proportional actuator and a hydraulic force; wherein

the hydraulic actuator and the hydraulic control valve are integrated with the valve housing body.

[CLAIM 8]

15 The EGR valve device according to claim 7, wherein

the valve housing body is separated into a valve section including the valve and a drive section including the hydraulic actuator and the hydraulic control valve; and

fixing sections for the valve section and the drive section are provided on a circle around an axis of the valve.

20 [CLAIM 9]

The EGR valve device according to claim 7 or 8,

wherein the hydraulic actuator is provided with a stopper for preventing a piston from disengaging from a hydraulic cylinder.

[CLAIM 10]

25 The EGR valve device according to any one of claims 7 to 9, wherein

the hydraulic actuator is a reciprocating-piston type hydraulic actuator;

the hydraulic control valve is a spool hydraulic control valve; and

the hydraulic actuator and the hydraulic control valve are arranged in parallel with a same advancing/retreating direction.

[CLAIM 11]

An EGR valve device comprising:

a valve housing body;

5 a valve guide provided inside the valve housing body for guiding a slide movement of a valve stem; and

a nozzle arranged toward the valve guide and having an orifice for jetting cooling oil.

[CLAIM 12]

The EGR valve device according to claim 11, wherein

10 a hydraulic pressure supplied to the nozzle is generated by an internal combustion engine equipped with the EGR valve device during an operation of the internal combustion engine.

[CLAIM 13]

The EGR valve device according to claim 11 or 12, further comprising:

15 a hydraulic actuator for opening and closing a valve; and

a hydraulic control valve for controlling the hydraulic actuator; wherein

a hydraulic pressure supplied to the nozzle is a hydraulic pressure branched from a hydraulic circuit for supplying the hydraulic pressure to the hydraulic control valve.

[CLAIM 14]

20 The EGR valve device according to claim 11 or 12, further comprising:

a hydraulic actuator for opening and closing a valve; and

a hydraulic control valve for controlling the hydraulic actuator; wherein

a hydraulic pressure supplied to the nozzle is a hydraulic pressure branched from a hydraulic circuit connecting the hydraulic actuator and the hydraulic control valve.

25